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SESSION V

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ARTIFICIAL METHODS OF HELPING BREEDING WOOD DUCKS—APPROACHES AND NEEDS

CHARACTERISTICS AND VALUES OF ARTIFICIAL NESTING CAVITIES

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Wood ducks readily accept artificial nesting devices in many regions of the United States. Although a truly amazing variety of nesting houses erected in various places have been used by woodies, this does not guarantee that every nest house program will be crowned with success. Some projects have been dismal failures.

We learned much about the nesting requirements of this duck from studies of natural cavities and nest houses. But until we know more about the responses of wood ducks to artificial nesting houses throughout their range, we must proceed carefully in forming recommendations to use nest houses as a means of augmenting natural production.

Characteristics

The greater the availability of natural cavities for wood ducks, the more nearly predator-proof the nesting houses must be to contribute substantially to production. Where natural cavities are scarce or wanting, nest houses should be at least as safe as natural cavities. Because they are conspicuous, artificial houses are more apt to attract the attention of predators than are natural cavities. To be of value, nest houses must have some built-in predator deterrents, or must be erected in a way that deters predators.

Nest Predation

The list of animals preying upon wood duck nests varies from year to year and from place to place. The raccoon (*Procyon lotor*) is

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at the top of the list almost everywhere that studies have been made. Fox squirrels (*Sciurus niger*), mink (*Mustela vison*), bull and rat snakes (*Pituophis melanoleucus* and *Elaphe obsoleta*), starlings (*Sturnus vulgaris*), and woodpeckers (*Melanerpes* spp.) are other important predators that destroy wood duck eggs and nests.

Raccoon Problem

Raccoons can be deterred from reaching nests in several ways. Elliptical entrances, 3 x 4 inches (Bellrose, 1953), and tunnel guards, 4 inches in diameter and 10 inches long (McLaughlin and Grice, 1952; Grice, 1960), have been used to prevent or deter raccoons from entering nest houses. Unfortunately, south of the Mason-Dixon line, adult raccoons are small enough to enter nest houses equipped with special entrances (Webster and Uhler, 1964). Both north and south of the Mason-Dixon line raccoons are also able to reach nests in many houses placed on posts in farm ponds and small impoundments.

To keep raccoons and other arboreal animals from reaching nest houses placed on posts, Uhler and McGilvrey (1965) used aluminum guards, 9 inches wide by 38 inches long, sandwiched around the posts. In five years of testing at the Patuxent Wildlife Research Center no raccoon or other arboreal animal has reached a nest house so shielded.

The elliptical entrance of the galvanized-pipe nesting house developed by Bellrose (1953) to reduce predation of nests by fox squirrels, mink, and bull snakes also prevented raccoons 10 pounds or larger from gaining access to nests. Although, in Illinois, nest predation by bull snakes was greatly reduced in metal houses, Smith (1961) reported that the larger rat snake in Louisiana continued to be the most important wood duck nest predator, even in metal houses. In Illinois in 1958-62, 73 percent of the wood duck nests in metal houses were successful, whereas in natural cavities in 1958-61, only 39.9 percent were successful (Bellrose *et al.*, 1964).

The galvanized-pipe nesting house is not initially as acceptable to wood ducks as the board house. The undercoat liner of the metal house appears to be objectionable to some wood ducks. Although liners of fiberboard are more readily accepted, they last through only one season of active use. A more satisfactory liner for metal houses is needed and should be developed in the near future.

Starling Problem

Although the problem of wood duck nest predation by arboreal animals has been partially solved, the problem posed by starling predation of nests appears more difficult. Fortunately, starlings consti-

tute a major threat only in populous areas where there is an interspersion of woods and farmland. Starlings did not become a menace to nesting-house wood ducks until the last decade. The loss of eggs in wood duck nests to starlings was not serious in Illinois until 1962, when 18.5 percent of the nests were destroyed; corresponding percentages for 1963 and 1961 were 23.8 and 20.6 percent respectively. Starlings also usurped large numbers of houses, many of which undoubtedly would have been used by wood ducks.

An indication that starling use of wood duck houses may eventually be reduced or eliminated lies in Francis Uhler's discovery that nesting starlings are more intolerant of light than are nesting wood ducks (Uhler and McGilvrey, 1965). At Patuxent, this fact was taken into account in the successful design of a horizontal nest house made of a cylinder 24 inches long and 12 inches in diameter provided with a 4- x 11-inch entrance (Fig. 1). Two types of material have been used for horizontal houses: galvanized metal pipe and woven wire covered with crushed rock roofing paper. Wood ducks readily accepted both types of horizontal houses and the exceedingly large entrances. Starling use of these houses has been almost negligible. The houses were erected on metal posts in small impoundments. Metal guards around the posts prevented raccoons from gaining access to the large entrances. Further testing of this design is essential to determine whether wood ducks were conditioned to use these houses by their previous experience with vertical metal houses at Patuxent. Moreover, various starling populations may respond differently to large entrances.

The horizontal house for wood ducks is limited to installation on posts in water areas. It could not be used successfully in trees because of the potential destruction of nests by arboreal animals. Nor could the large entrance be used in vertical houses, at present, without resultant nest destruction by raccoons. To discourage starling depredation, we attempted in Illinois to permit more light to enter vertical houses and yet retain the raccoon-deterrent entrance. Five holes, each 2 inches in diameter, were bored in close proximity to the 3- x 4-inch elliptical entrance. In spite of the additional light entering the nest cavity, starlings nested in the new houses as readily as in the older models.

Most of the wood duck nesting houses in the Atlantic Flyway have been erected on fence posts placed in the shallow water of ponds and marshes. In the Mississippi Flyway, most of the nest houses have been erected on the trunks of trees, usually back from the water's edge. Severely fluctuating water levels prevalent on many

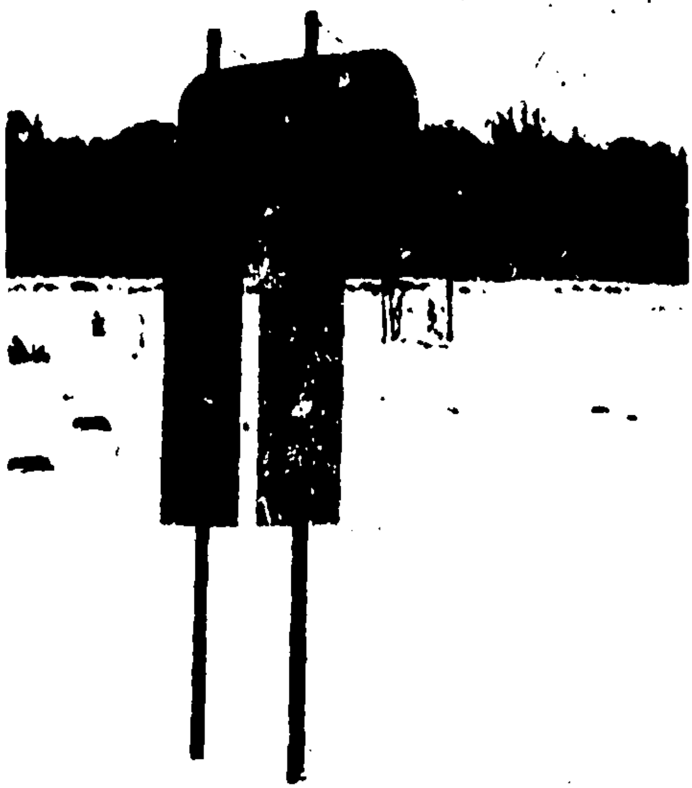

Figure 4. Horizontal Wood Duck Nesting House. Design of this new structure was based on F. M. [illegible] discovery that nesting starlings are more intolerant of light than are nesting wood ducks. Considerable light enters the 24-inch long, 12-inch diameter cylinder [illegible] with a 4 by 11-inch entrance. Raccoons are prevented from gaining access to the large entrance by metal guards of [illegible] gauge aluminum [illegible] wide and [illegible] long. They can be two strips bolted together (see left guard) or a single piece folded and fastened on one side (see right guard). When placed in small impoundments the bottom of the guard must be no higher than maximum pool level. Structures erected in this manner were readily used by wood ducks, were seldom visited by starlings, and were easy to check by canoe at the Patuxent Wildlife Research Center. Additional tests of this house are needed at other locations.

water areas in the Mississippi Flyway preclude the extensive use of post-attached houses.

Value of Houses

Unquestionably, nesting houses can increase local breeding populations of wood ducks. For example, at Quiver Creek in Mason County,

Illinois, only 10-15 pairs of wood ducks nested in a 1-mile stretch prior to the placement of wood duck houses. After nesting houses were erected, the breeding population rose to stabilize at 90-100 pairs.

On a more extensive scale, the value of wood duck houses to production can be measured by house use. Bellrose *et al.* (1964) have shown that a high rate of nest-house use indicates a high rate of nest success.

Natural cavities in Illinois provided sites for successful nests for 28 to 54 percent of the wood ducks using them during a 6-year period. Cavity use ranged from 26 to 55 percent.

Atlantic Flyway

The largest concentration of wood duck nest houses and some of the highest rates of use have been in New England. In Massachusetts, McLaughlin and Grice (1952) reported 45 percent use of 1,200 nest houses. Over a 10-year period, Berkley (1964) found 66 percent of 6,225 houses used in Connecticut. Cronan (1957) reported that, in Rhode Island, wood ducks occupied 53 percent of 102 boxes in 1955, and 72 percent of 85 houses in 1956. In Vermont, Miller (1952) reported that the rate of use of 60 to 100 houses ranged from 70 percent in 1949 to nearly 90 percent in 1951.

Elsewhere in the Atlantic Flyway, Klein (1955) found that 22 percent of 135 nest boxes on 48 marshes on farms in New York were occupied by wood ducks. Decker (1960) had rates of use of from 15 to 57 percent of 32 to 79 houses on a marsh in northwestern Pennsylvania. At the Patuxent Research Center in Maryland, wood ducks occupied 26 percent of 136 houses of various types in 1964, and 30 percent of 137 houses in 1965 (Uhler and McGilvrey, 1964 and 1965). Hester (1962) reported a high rate of use of nest houses by wood ducks on a series of small ponds near Raleigh, North Carolina.

Mississippi Flyway

Most of the nest-house programs in the Mississippi Flyway have been in the northern half of the flyway. The largest number of wood duck houses have been erected in Ohio, where from 874 to 1,569 boxes were available between 1954 and 1962 (Martinson, 1962). The occupancy of these houses varied from 15.6 percent to 31.7 percent. Illinois has had the second largest number of houses in the flyway: from 334 to 723 board houses were available between 1939 and 1945 (Bellrose, 1953) and from 273 to 308 metal-pipe houses were available between 1958 and 1962. The average rate of use of the board

houses by wood ducks was 49 percent; average for the metal houses was 40 percent.

At Burlington, Iowa, Leopold (1951) had from 3 to 17 houses in his yard, in 1943-50, and found from 3 to 12 of these houses occupied each year. Farther up the Mississippi River at Lake Odessa, Iowa, wood ducks nested in 69 percent of 26 board houses in 1950 (Shreiner and Hendrickson, 1951).

The rate of use of wood duck houses in Wisconsin has been low (Jahn and Hunt, 1964). Of 345 to 404 houses examined between 1945 and 1958, an average of only 9 percent were used. From 1951 to 1961, Louisiana biologists checked a total of 1,229 houses for wood duck nests and found that 33.8 percent had been used (*Smith, 1961*).

CONCLUSIONS

Many wood duck nesting houses, besides those mentioned, have been erected in both the Atlantic and Mississippi Flyways, but no published records of their use are known. Enough is now known about the use of nesting houses in many areas of the wood duck's range for us to realize the potential value of this management tool. However, nesting houses will not be of optimum value until the following improvements are made:

1. Wood duck houses erected in trees south of the Mason-Dixon line need deterrents to small raccoons and rat snakes.
2. Galvanized-pipe houses need liners which are initially more acceptable than undercoat to wood ducks.
3. A vertical box needs to be developed which will deter starlings from using it for nesting.

When these challenges are met, artificial nesting devices can be recommended for large-scale programs designed to increase the production of wood ducks on a flywaywide basis. Until better wood duck houses are devised, more pilot house programs should be inaugurated, especially in the southern states. Investigations should provide information on occupancy by wood ducks in relation to habitat, predator pressures, desirable grouping and density of houses, optimum placement of houses, and similar factors.

Woods in the Mississippi Delta country and along major streams are being bulldozed at an increasing rate to create more farmland. We can anticipate only a continuing decline in natural nest sites for wood ducks as our human population increases. As our waterfowl resource becomes more valuable in the years ahead, management measures that at one time were economically impractical become more

and more feasible. In this context we should keep in mind the use of wood duck houses as a tool in waterfowl production.

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AN EVALUATION OF HAND-REARED WOOD DUCKS AT GOOSE ISLAND, MISSISSIPPI RIVER, WISCONSIN

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In the years 1958 through 1960, the Wisconsin Conservation Department and Badger State Sportsmen Club of LaCrosse, Wisconsin conducted an experimental wood duck (*Aix sponsa*) rearing project at Goose Island in the Upper Mississippi National Wildlife Refuge. The principal objective was to determine if the release of hand-reared wood ducks resulted in an increased local breeding population. While this study did not prove measurably successful, various aspects of the propagation program and band recovery data seem worthy of presentation.

BACKGROUND INFORMATION

At the time this project was developed in 1957, Mississippi Flyway wood duck populations were at a relatively low level. Closed seasons had been in effect in Wisconsin since 1954. In our experience, erection of hundreds of nest boxes and several years of harvest restrictions were doing little to improve the status of the species. Nest box utilization was averaging only 9 percent. We considered wood duck stocking worth exploring as a way to help the situation. There was some evidence from reports of Hanson (1951), Hunt (1956), McKeever (1945), McCabe (1947) and Yeagley (1953 and pers comm. November 1956), that (1) wood ducks could be hand-reared in large numbers and (2) some birds survived to return and nest in release areas. However, no major studies had evaluated wood duck propagation.

For a number of years, the Badger State Sportsmen Club had been rearing 1,000 or more mallards (*Anas platyrynchos*) annually for release near LaCrosse. State support was provided in the period 1949-1953 (Hunt *et al.*, 1958). Because of discouraging results from mallard stocking, Conservation Department personnel proposed that the club shift their propagation program to wood ducks. Club members expressed keen interest in the proposal and a three-year study was planned.

In a formal agreement, state responsibilities included provision of 200 breeders, $2,000.00 annually for feed and other equipment, supervision, and record keeping for all breeding, rearing, banding and releasing activities. Club obligations included providing a caretaker, rearing facilities and assistance in releasing. As part of the study, the state provided 1,500 feet of lumber for the club to build 100 nest